

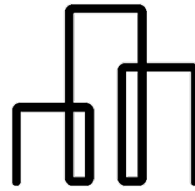


Advanced Microgrid Solutions

SUSAN KENNEDY

# ENERGY ADVISORY COMMITTEE

SEPTEMBER 29, 2015



## Advanced Microgrid Solutions

**Susan Kennedy**

Founder and CEO of Advanced Microgrid Solutions

Co-Founded AMS with Jackalyne Pfannenstiel, former Assistant Secretary US Navy for Energy & Environment

List of Priors:

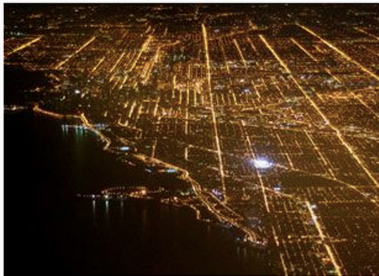
- Chief of Staff, Governor Arnold Schwarzenegger
- Commissioner, California Public Utilities Commission
- Cabinet Secretary, Governor Gray Davis
- Communications Director, US Senator Dianne Feinstein

# SOUTHERN CALIFORNIA EDISON

## 2018 Local Capacity Resource Priority Areas

**greentechmedia:**

### Inside SoCal Edison's Groundbreaking 2.2GW Grid Modernization Plan

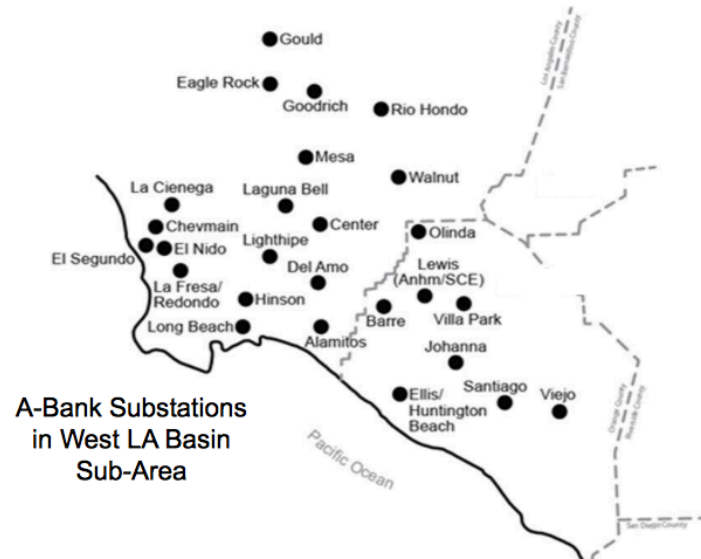


A new model lets distributed solar, energy storage and efficiency stand with power plants as grid resources.

Jeff St. John  
November 21, 2014

Two weeks ago, utility Southern California Edison launched a real-world experiment in grid-edge economics, one that's going to unfold in real time and at gigawatt scale.

In a first for the utility industry, SCE announced it would buy hundreds of megawatts of distributed solar, behind-the-meter batteries, automated demand response and targeted energy efficiency as part of its 2,200-megawatt Local Capacity Requirement (LCR) procurement for its grid-stressed West Los Angeles Basin region.



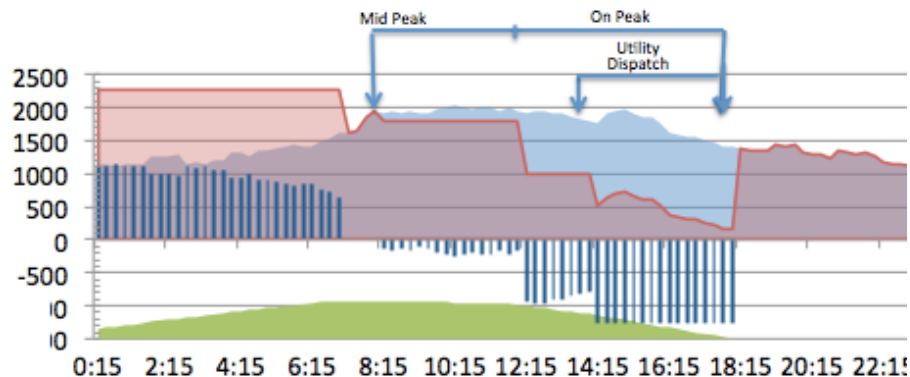
# AMS 10 MEGAWATT HYBRID- ELECTRIC BUILDING PROJECT



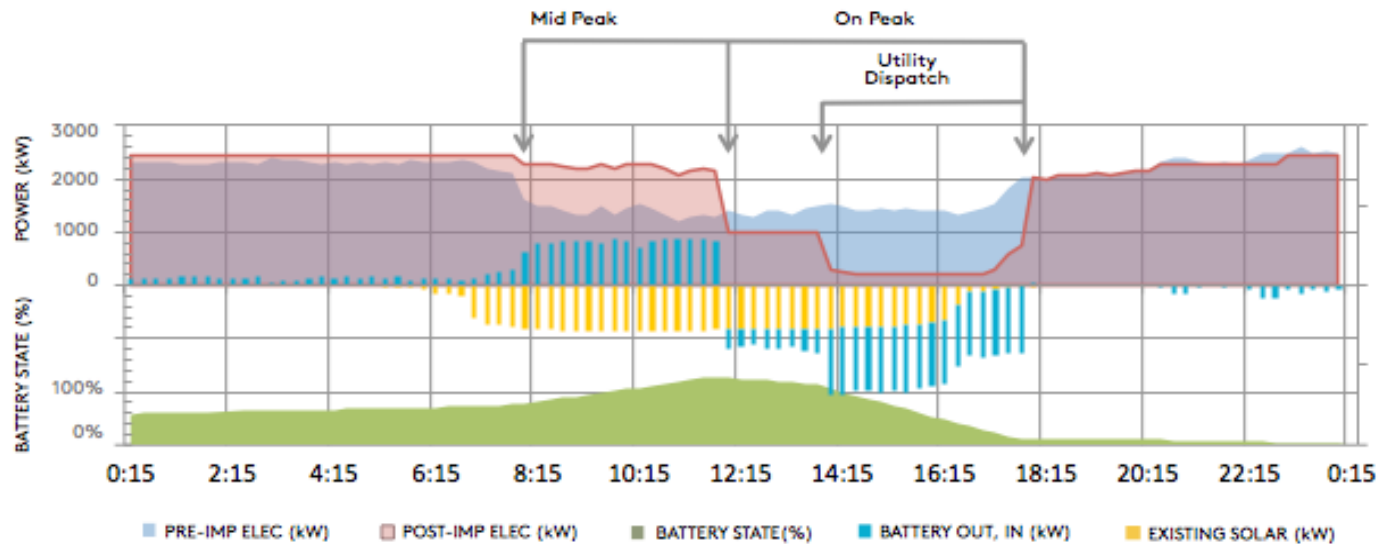
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- 26 Commercial Office Buildings
- 25% Peak Demand Reduction
- \$900,000 / year Energy Savings
- 10 MW Firm, Dispatchable Capacity
- Zero Emissions
- No Distribution Upgrades



# PEAK SHAVING / PV INTEGRATION / UTILITY CAPACITY



|                  |                           |
|------------------|---------------------------|
| Battery Size     | 1,250 kW/7,875 kWh        |
| Battery Duration | 6 Hour                    |
| Dispatch Date    | 08.28.14 [CPP Event Date] |
| Dispatch Time    | 2:00 PM - 6:00 PM         |
| Tariff           | TOU/CPP-DR                |

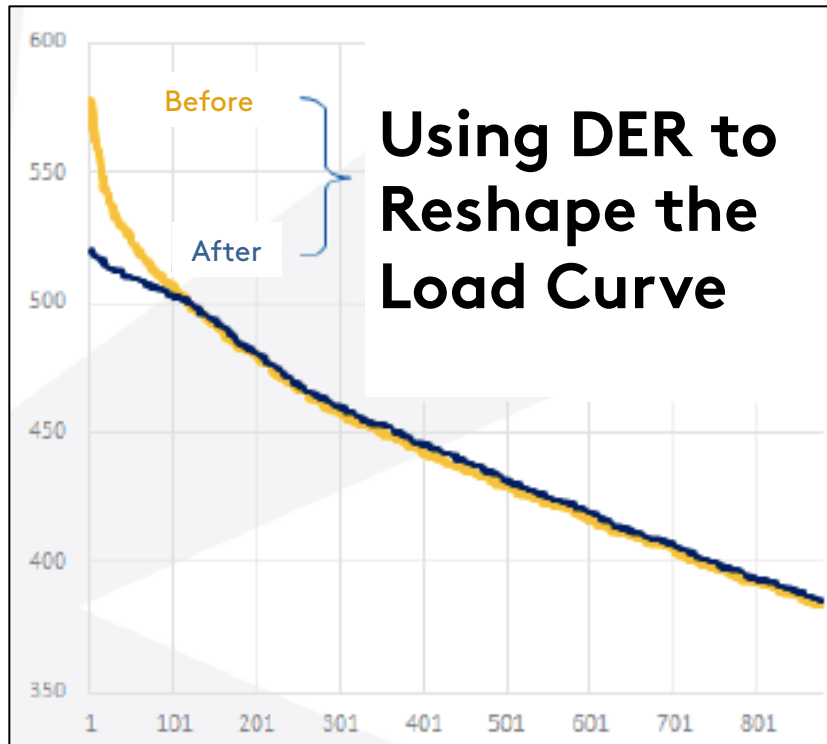
## 1 MW Firm, Dispatchable Capacity for Utility

|               | Before       | After        | Savings    | Savings |
|---------------|--------------|--------------|------------|---------|
| <b>Energy</b> | \$ 1,013,206 | \$ 978,124   | \$ 35,082  | 3.5%    |
| <b>Demand</b> | \$ 643,213   | \$ 484,006   | \$ 159,207 | 24.8%   |
| <b>Total</b>  | \$ 1,663,785 | \$ 1,469,495 | \$ 194,290 | 11.7%   |

# FULL DEPLOYMENT OF ENERGY STORAGE

|                     |   |
|---------------------|---|
| Building Standards  | All buildings required to install energy storage devices<br>Advanced Metering, Auto-DR  |
| Distribution System | Conservation Voltage Reduction (CVR & Volt/VAR<br>Optimization (VVO) deployed on prioritized feeders  |
| Utilities           | Rate Design incentivizes energy storage and DSM<br>Cost recovery mechanisms for CVR/VVO, DSM and BTM<br>ESS<br>LCOE valuation models recognize multiple-use<br>applications (RA, flexible capacity, Ancillary Services) |
| Wholesale Market    | Clear rules allow wholesale market participation for<br>multi-use unbundled BTM storage products (e.g.<br>Capacity, Frequency, DSM, Congestion Relief)<br>Market Pricing for unbundled energy storage attributes        |

# MEET THE LOAD CURVE OR RESHAPE IT?

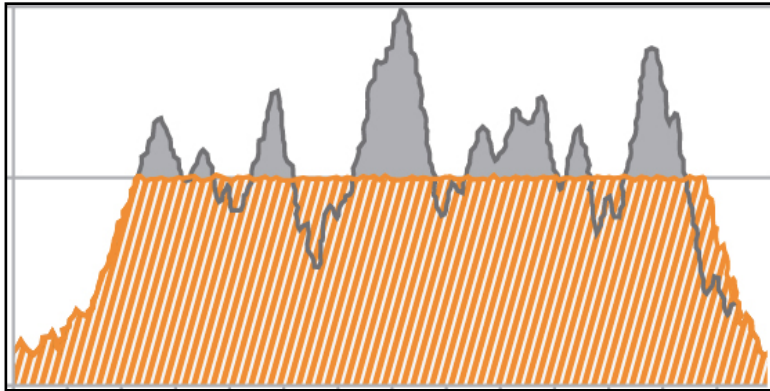


Utility Spending:  
**\$1 trillion** in the  
next decade

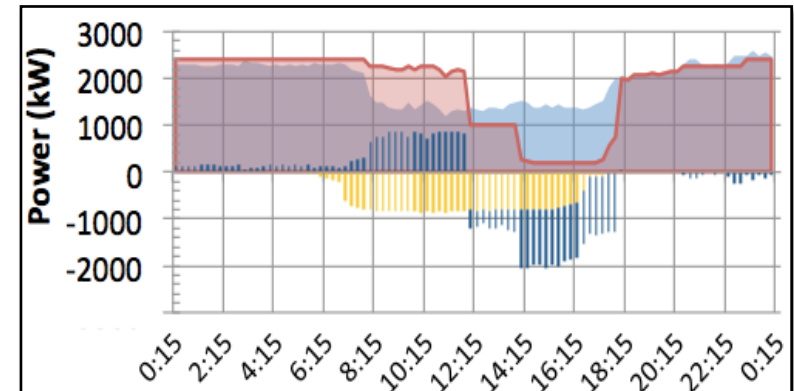
Utility spend on  
distribution system  
alone in 2014:  
**\$100 billion (EEI)**

- Distributed Energy Resources/Energy Storage
- Replace or Reduce Need for Distribution Upgrades
- Replace or Reduce Need for Spinning Reserves/Peaking





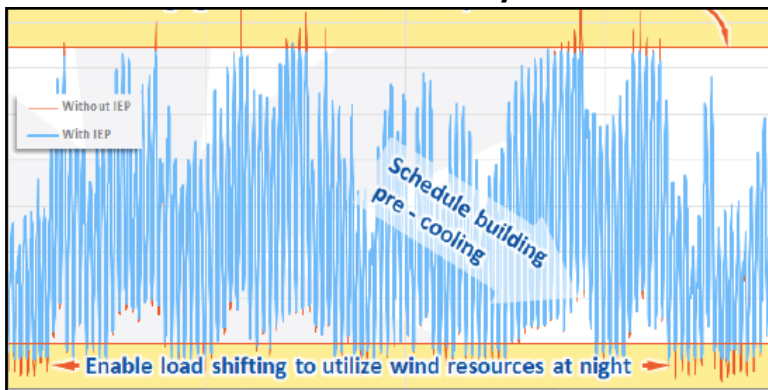
Peak Shaving



Load Shifting/Shaping

# ENERGY STORAGE BEHIND THE METER

Back Up Generation  
Power Quality



Negative Demand  
Recapture

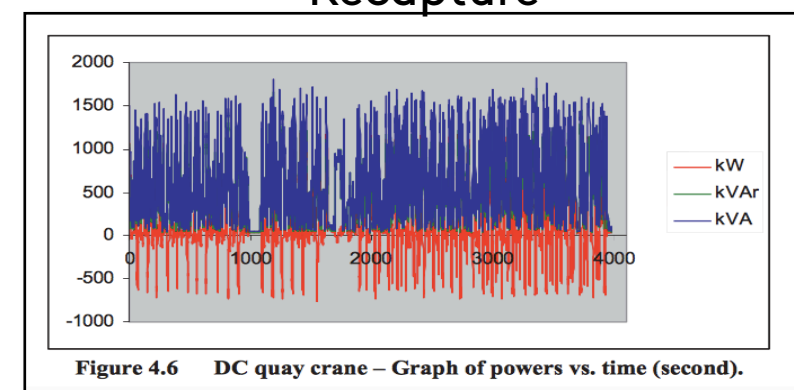
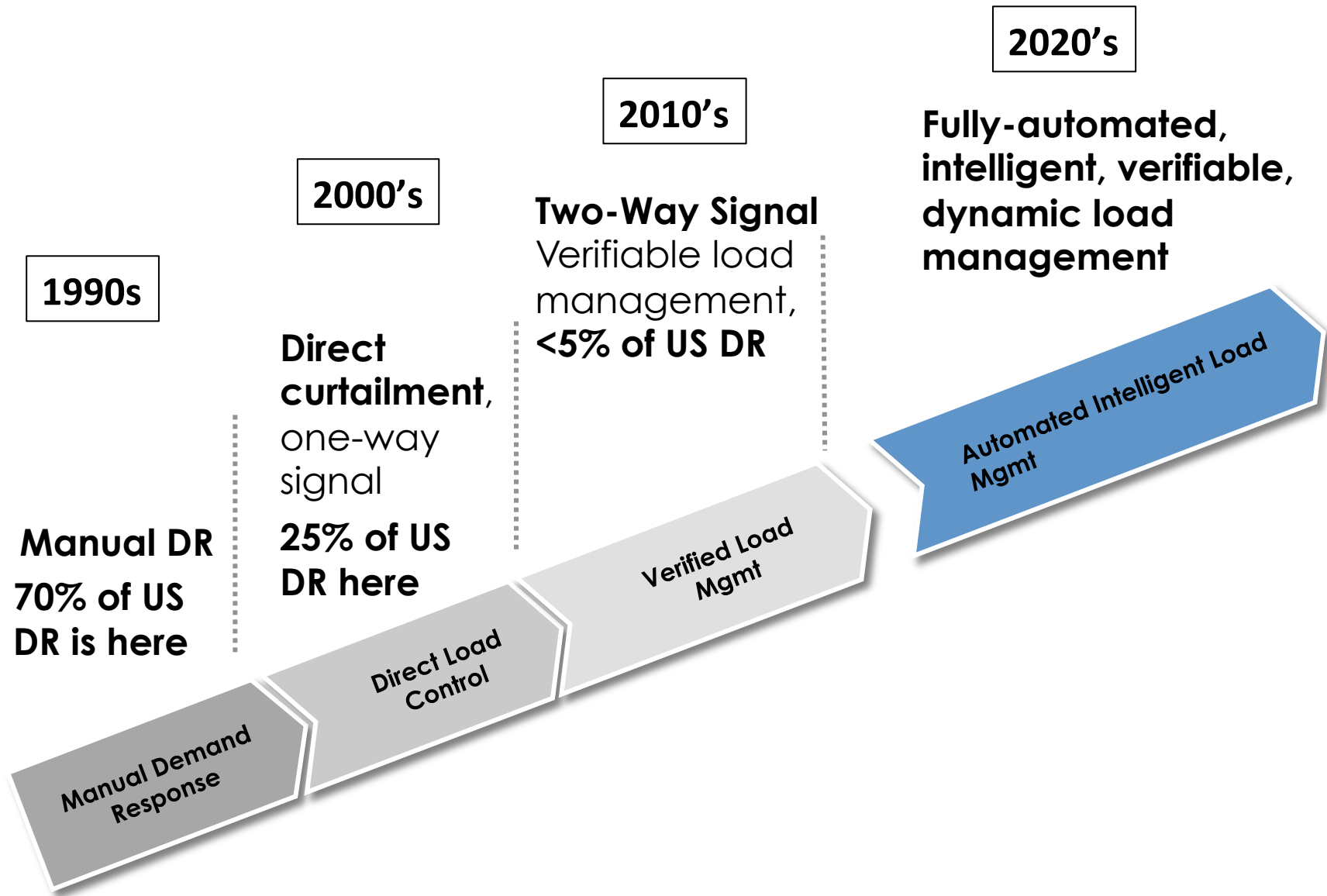


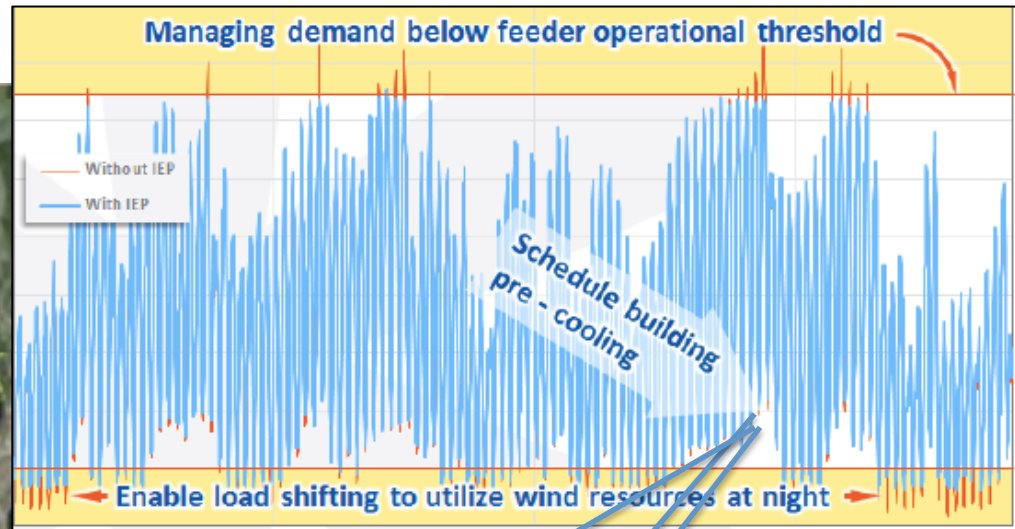
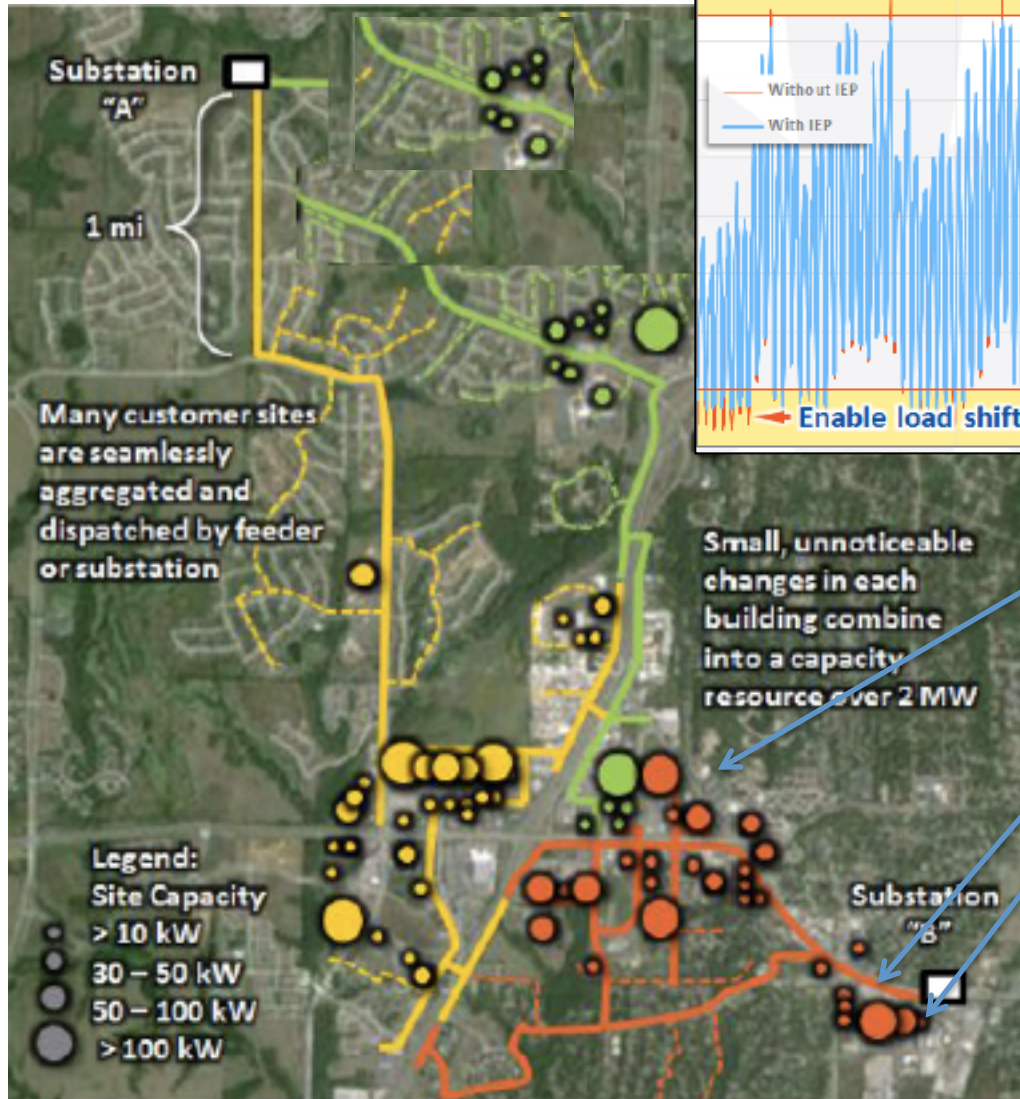
Figure 4.6 DC quay crane – Graph of powers vs. time (second).



# DEMAND SIDE MANAGEMENT IS FULLY AUTOMATED, INTELLIGENT, VERIFIABLE AND DYNAMIC



# AGGREGATED DSM ON TARGETED FEEDERS



# END TO END VALUE CHAIN WITH ENERGY STORAGE

## UTILITY / GRID OPERATORS



## Distributed Resource Aggregation

Asset Management, O&M, Network Operations,  
Active Energy Management

## END USE CUSTOMER



### Distribution Level Services

- Firm Dispatchable Capacity
- Dynamic Load Management - Volt/VAR optimization
- Generation Sink
- Wholesale Energy Market Products
  - Day Ahead
  - Real-time
  - Frequency



### Grid Edge Services

- Peak Shaving (GHG Reduction)
- Energy Cost Reduction
- Energy Islanding / Critical Loads
- Demand Response Revenue Generation
- Solar integration
- EV Charging Integration